

PATENT ABSTRACTS OF JAPAN

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(54) TERMITE-CONTROLLING CONCRETE

(57)Abstract:

PURPOSE: To prevent termites from entering woods in a house out of the ground and retain sustain release effect of a specific absorbing agent containing a termites-controlling agent absorbed and carried therein over a long period by including the absorbing agent in concrete.

CONSTITUTION: This termite-controlling concrete is obtained by incorporating one or two or more adsorbing agents selected from a group consisting of active carbon, zeolite, active alumina and silica gel and containing a termite-controlling agent adsorbed therein into concrete. The content of the termite-controlling agent carried on the adsorbing agent is 1-30 pts.wt. based on 100 pts.wt. of the concrete. As the termite-controlling agent, chlorpyrifos or creosote oil or 8-hydroxyquinoline is preferably used. When the termites eat pillars in a house, almost termites pass through crack or the surface of concrete base out of the ground which the termites inhabit and enter the interior of the pillar, but since the controlling agent is diffused in the crack of concrete inside and on outer wall face, passages of the termites are prevented and damage and collapse of house due to termites are prevented.

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CLAIMS

[Claim(s)]

[Claim 1] Termite prevention concrete which makes concrete come to contain a kind or two sorts or more of adsorbents chosen from the group which consists of the activated carbon and the zeolite to which the termite prevention agent was made to stick, an activated alumina, and silica gel.

[Claim 2] The content of the adsorbent to which the termite prevention agent was made to stick is concrete 100. Termite prevention concrete according to claim 1 which is the one to 30 section to the section.

[Claim 3] Termite prevention concrete according to claim 1 whose termite prevention agents are chlorpyrifos or creosote oil, and 8-hydroxyquinoline.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention has the description which can hold the effectiveness over a long period of time according to the gradual release effectiveness of an adsorbent while a termite will bar going into the timber of a house from underground by **, if the concrete which contains a termite prevention agent when it states in more detail is used for the foundation of a house about termite prevention concrete.

[0002]

[Description of the Prior Art] JP,1-295948,A etc. is indicated as an approach of disinfecting from the former the whole approach or whole ground which applies a prevention agent to timber and is poured into it as an approach of protecting a house from a termite. However, the concrete which gave the termite prevention function is not known. Moreover, it is not desirable to make the column of the house which each prevention agent is toxic, and has a possibility that people may touch directly since there are also many things accompanied by an offensive odor etc. contain a termite prevention agent. The inside of these prevention agents, dieldrin especially with strong toxicity, heptachlor, and BHC (benzene hexa chloride) DDT (p, p' - dichlorodiphenyltrichloroethane), PCP (pentachlorophenol sodium salt), etc. also have consideration of other environments, and the activity is already forbidden.

[0003] Ten years are made into the limit even if the effectiveness duration has many cases of about several years even if it performs termite prevention processing to timber by these approaches, in case a house is built, and it performs careful prevention processing. Therefore, in order to maintain the termite prevention effectiveness, it is necessary to repeat prevention processing several years - every ten years. However, it has been a big problem in order for termite prevention processing of an existing house to take a large amount of costs.

[0004] Since all the active principles of a prevention agent are volatility, the cause of disappearance of the termite prevention effectiveness is because the path which a clearance is transmitted in *****, and a termite is transmitted from underground to evaporating gradually and disappearing at a long period of time and the concrete foundation supporting the column of a house in the foundation of a house, and goes into the interior of timber is made.

[0005]

[Problem(s) to be Solved by the Invention] In order to prevent the erosion of the timber of the house by the termite in view of the above troubles, when the termite which lives in the earth goes into timber, it is going to develop and offer the concrete which has the prevention function of a termite for using it for the foundation of the house which serves as a path a passage.

[0006]

[Means for Solving the Problem] When a termite carried out erosion of the timber and this invention person collapsed a house, the termite was observed at the data which invade into a column through [almost] the gap or front face of a concrete foundation of a house from underground. In order to prevent the damage of a termite, when intercepting the path to the concrete foundation using the construction material which cannot pass a termite, even if it did not give termite prevention nature to the timber itself, paying attention to the point that the damage of a termite can be prevented, it inquired about the presentation of the concrete which has termite prevention nature.

[0007] Consequently, since stripping of the prevention agent was gradually carried out from the pore of an adsorbent when it discovers that high termite prevention nature can be given by mixing the adsorbent which supported the termite prevention agent to concrete and support of the prevention agent is further carried out to a specific adsorbent, the effectiveness reached [that it can hold for a long period of time and] this invention based on a header and this.

[0008] That is, it is the termite prevention concrete which makes concrete come to contain a kind or two sorts or more of adsorbents chosen from the group which consists of the activated carbon and the zeolite to which the termite prevention agent was made to stick, an activated alumina, and silica gel.

[0009] The content of the termite prevention agent which the adsorbent was made to support here is concrete 100. The case where chlorpyrifos or creosote oil, and 8-hydroxyquinoline are used for a termite prevention agent to the section when it is the one to 30 section is more desirable.

[0010] This invention is explained in detail below.

[0011] The termite prevention concrete of this invention makes concrete contain the specific adsorbent which made the termite prevention agent adsorb and support. although many drugs are known by the termite prevention agent — what has strong toxicity — many — in addition to this — the consideration on an environment — it is — BHC and DDT etc. — there are some to which the activity is forbidden like. As an usable prevention agent, there are creosote oil, chlorpyrifos, pyridaphenthion, tetrachlorvinphos, etc. although it is the inside of these, creosote oil, and an organic phosphorus system compound — chlorpyrifos (O, O - diethyl O - 3, 5, 6-Tori Krol -2 - pyridyl - phosphorothioate) with the high prevention effectiveness with comparatively little toxicity — and — 8-Hydroxyquinoline is desirable. Furthermore, the complex of 8-hydroxyquinoline and a metal, for example, Zn, aluminum, Fe, Mn, Cu, Mg, Sn, nickel, Co, Ba, calcium, Sr, etc., 8-hydroxyquinoline and the chloride of these metals, a sulfate, a nitrate, a nitrite, a sulfite, phosphate, a carbonate, a bicarbonate, a silicate, another organic oxalate and organic polybasic acid salt, etc. are usable.

[0012] In order to make the above-mentioned termite prevention agent adsorb in this invention, it is necessary to use a kind or two sorts or more of adsorbents chosen from the group which consists of activated carbon, a zeolite, an activated alumina, and silica gel.

[0013] The activated carbon used here usually has a 100m² number or the big surface area beyond it perg, and if it is a carbon material in which adsorbent [high] is shown, it can be broadly used for it. Although carbide or coal, such as coconut husks or timber, is usually used, any are sufficient as the raw material of activated carbon. Moreover, with the steam or the carbon dioxide, an aktivationsmethode is also an elevated temperature or could be acquired by which approaches, such as a zinc chloride, a phosphoric acid, and concentrated-sulfuric-acid processing.

[0014] Moreover, any of granular charcoal, sized activated carbon, formed activated carbon, or granulation charcoal are sufficient as the configuration of activated carbon, and fibrous activated carbon has adsorbent [high] that it is easy to obtain a thing especially with a large specific surface area, and also when it mixes in concrete, it has a function as the reinforcement. Formed activated carbon follows a conventional method and is a carbon material 100. A petroleum pitch or a coal tar of the 30 to 60 section etc. is added to the section as a binder, after [mixing molding] activation is carried out to it, and it is adjusted to it.

[0015] Activated carbon is unique matter which has adsorbent [which was known as a non-polar adsorbent which has big Van der Waals force including the countless pore which consists of a carbon front face, and was extremely excellent]. While adsorbent [high] is shown to almost all gases or liquefied matter, since it has alkalinity, there is also a function to neutralize the formic acid which a termite secretes and to protect concrete.

[0016] The zeolite used for this invention mainly consists of aluminosilicate of alkali or alkaline earth metal, and forms the skeletal structure of three dimensions with a big cavity with the regularity of the form where SiO₂ tetrahedron of methane mold structure and AlO₄ tetrahedron shared the carbon atom per piece mutually.

[0017] According to including [the oxygen atom of the frame which forms the zeolite] cyclic structure, the zeolite has the aperture which the range of 3-10Å fixed, while having the molecular-sieving nature based on this pore structure, it has a big specific surface area which reaches more than 500m²/g, and adsorbent [by Van der Waals force /high] is shown. Although the presentation, structure, pore volume, grain size, and especially a configuration have the balance aperture which does not limit and is obtained by the synthesis method, they are [the zeolite used for this invention] usable. [of the zeolite produced to nature such as an others and KAIRYOKU stone and a FUTSU stone,]

[0018] The activated alumina used for this invention shows adsorbent [high] according to the Van der Waals force while having a big specific surface area by pore structure with the presentation which used the oxidation alumina as the principal component. The pore volume, grain size, and especially a configuration take into consideration the description of the adsorption capacity and others at the time of mixing in termite prevention concrete, although not limited, and are pore volume. 0.3 ml/g 30-60 meshes (particle diameter of about 0.2-0.4mm) of grain size are above desirable.

[0019] Moreover, the silica gel used for this invention is the adsorbent which was made to solidify the silicic-acid colloidal solution and was manufactured. A principal component has pore structure by the silicon dioxide, has the specific surface area of 90-500 m²/g, and shows adsorbent [high] according to the Van der Waals

force. The pore volume, grain size, and especially a configuration take into consideration the description of the adsorption capacity and others at the time of mixing in termite prevention concrete, although not limited, and are pore volume. 0.3 ml/g 30-60 meshes (particle diameter of about 0.2-0.4mm) of grain size are above desirable.

[0020] Each above-mentioned adsorbent has pore structure and a big specific surface area, and has the similarity which shows adsorbent [high] according to the Van der Waals force. If it is only the object which makes concrete contain a termite prevention agent, there is an approach which the fiber for reinforcement which mixes after mixing directly or carrying out mixing granulation of the solid prevention agent to other matter, or is mixed in concrete is made to contain. However, the termite prevention concrete of this invention has the description in the point of making the prevention agent holding in the pore, by making the prevention agent of a termite stick to a specific adsorbent.

[0021] A termite prevention agent is held in the pore of an adsorbent, and sustained-release is given by the Van der Waals force of an adsorbent. therefore — like the adsorbent which minute pore structure progresses and has a high specific surface area — sustained-release — excelling — a long period of time — the effectiveness — self-sustaining **** — things become possible and are desirable. From this viewpoint, activated carbon and a zeolite are more desirable in these adsorbents.

[0022] an adsorbent — the shape of a grain, powder, and SENI — all are usable. Moreover, although the particle of the adsorbent which supported the prevention agent has the one effective for closing the narrow gap of the concrete foundation used as the path of a termite where particle size is smaller, its about 30-60 meshes are desirable from handling.

[0023] If a termite prevention agent is a liquid, it will not ask oils and an emulsion, but it can use them for them, making these adsorbents able to adsorb and support them. Moreover, especially the amount of support of the prevention agent to an adsorbent is an adsorbent 100 although not limited. The range of the one to 50 section is desirable to the section.

[0024] The termite prevention concrete of this invention is the concrete which made the adsorbent which made the termite prevention agent adsorb and support contain. The mortar which added water to sand and cement and was mixed is also contained in this invention besides the usual concrete which added water to concrete at ballast, sand, and cement, and was mixed. Mixed ratios, such as sand in the case of adjusting concrete and mortar here, cement, and water, can apply the wide range ratio usually used.

[0025] In case concrete is adjusted, after adding water to ballast, sand, and cement and mixing, before yet not solidifying, the termite prevention concrete of this invention is obtained by adding the adsorbent which made the termite prevention agent adsorb and support, mixing to homogeneity and solidifying it. It will be concrete 100 if the termite prevention effectiveness is taken into consideration, although the direction with little [although especially the content of an adsorbent is not limited, in order to maintain the reinforcement of concrete] adsorbent is desirable. The one to 30 section is desirable to the section. It is because the inclination for the reinforcement of concrete to fall a little is shown when it becomes insufficient [the 1 or less section / a prevention operation] a little [the content of the adsorbent which supported the prevention agent] and the content of an adsorbent becomes the 30 or more sections on the other hand. However, when the reinforcement function of concrete also has the content of an adsorbent like activated carbon fiber in an adsorbent, even if it raises the content of an adsorbent further, reinforcement may not fall.

[0026] Even if it makes various adsorbents support the prevention agent of tales doses, the effectiveness changes with properties of an adsorbent. For example, RENTOREKU (Dow Chemical Co. make, termite prevention agent) LB-300 which used chlorpyrifos as the principal component (oils) If the 5 sections are supported, in the case of activated carbon fiber, a termite will escape immediately. the case of an alumina, silica gel, a zeolite, granular active carbon, etc. — a termite — ** — although it therefore goes, it stops in the distance of a certain extent, and becomes extinct after that. Furthermore, shortly after the amount of support increases, it will come to escape.

[0027] The behavior of a termite is also almost the same as when an adsorbent is mixed and concrete is adjusted, and it is activated carbon 100 about the prevention agent 30 sections. About the thing 5 section which the section was made to support, it is concrete 100. When the section is mixed, a termite walks on it, and after [which operated] licking, it becomes extinct after a while.

[0028] In addition, the adsorbent which made the above-mentioned termite prevention agent adsorb and support may mix two or more adsorbents which it could be single, and concrete could be made to contain, or supported the prevention agent by the ratio of arbitration, and concrete may be made to contain it. Moreover, what combined the component of others, such as reinforcing materials and a waterproofing agent, and was mixed can be used for the concrete of this invention.

[0029] Activated carbon 100 of the grain size 30 obtained by adjusting the termite prevention concrete of this

invention actually considering coconut husks as a raw material as an adsorbent — 60Mesh To the section, they are RENTOREKU oils as a termite prevention agent. Sprinkling LB-300 and the 30 (Dow Chemical Co. make) sections on granular active carbon, it mixes to homogeneity and one or more nights sealing and neglect of are done. In addition, neglect time amount becomes uniform and has so desirable that it is long the amount of support.

[0030] Concrete 100 which mixed the activated carbon 30 section which adsorbed and supported the termite prevention agent at the rate of a compounding ratio of a conventional method After the section is mixed to homogeneity in the condition of yet not solidifying, termite prevention concrete is obtained by making it solidify. [0031]

[Function] While moisture falls out with the time amount progress after mixing / adjustment of concrete and concrete hardens, a detailed opening generates inside concrete. Stripping of the termite prevention agent held at the adsorbent inside concrete is carried out gradually, and it is [agent] full of this gap, and stripping of the prevention agent of a minute amount is continuously carried out also to the wall surface exterior of concrete.

[0032] Erosion and breaking of the house according [when a termite carries out erosion of the column of a house, go into a column through the crack or front face of a concrete foundation from the underground which a termite almost inhabits, but since stripping of the prevention agent is carried out to the crack and external wall surface inside concrete, passage of a termite is prevented, and] to a termite by this are prevention ****.

[0033] Furthermore, although each termite prevention agent of this invention is volatility, it adsorbs in pore according to an operation of Van der Waals force with a strong pore front face, an adsorbent is fried, and volatility is remarkably controlled as compared with the case where impregnation of the prevention agent is only carried out. For this reason, a termite prevention agent is gradually emitted over a long period of time, and the prevention effectiveness can be held.

[0034]

[Example] An example is given below and this invention is explained still more concretely.

[0035] (Examples 1-15, examples 1-4 of a comparison) It is [the activated carbon of specific-surface-area 1000 m²/g obtained considering coconut husks as a raw material as an adsorbent, grain size 30 - 60Mesh, and] an aperture. 5A and natural zeolite with a mean particle diameter of 10micro were used.

[0036] trade name "SHINTORENTOREKU oils [] which are the organic phosphorous compounds of a TORIKURORU pyridyl system as a termite prevention agent — LB-300 and emulsion [] — L-250 (the U.S. Dow Chemical Co. make) and creosote oil were used. After sprinkling a termite prevention agent over an adsorbent first and mixing to homogeneity, one nights were saved in the state of sealing, and the prevention agent was made to adsorb and support.

[0037] As concrete, sand:Portland cement:water was kneaded by 4:2:1 and concrete mortar was adjusted according to JIS A 1138. Concrete mortar 100 The adsorbent which supported the termite prevention agent adjusted previously with the ratio shown in a table 1 was added to the section, it mixed to homogeneity, and termite prevention concrete was adjusted (examples 1-15).

[0038] It is concrete 100 because of a comparison. Only activated carbon adjusted only what mixed only the 10 sections only of zeolites, the thing which only the 30 sections only of creosote oil mixed, and also concrete mortar to the section (examples 1-4 of a comparison).

[0039] After having thrown in and taken lessons for the concrete mortar which was adjusted as mentioned above and which is not yet solidified from mortar 3 ream shuttering, being filled up uniformly with a stick and removing air bubbles, it riped for two days and removed from shuttering.

[0040] Furthermore, what recuperated itself more than for seven days was broken with the hammer, it prepared in particle size of 5-20mm, and termite prevention concrete was obtained. The presentation of the examples 1-15 which are the above, and were made and acquired, and the examples 1-4 of a comparison is shown in a table 1. In addition, it sets to a table and they are SHINTORENTOREKU oils. LB-300 And emulsion L-250 Respectively LB-300 And L-250 It displayed.

[0041] Reinforcement was investigated when breaking the obtained concrete with a hammer. As a result of comparing the examples 1-3 from which the oils content of an adsorbent is the same as that of, and the mixing percentage to concrete differs, it is an example 1 (it is the mixing percentage 10 section to the concrete 100 section). And example 2 (mixing percentage 25 section) Reinforcement is an example 3 (mixing percentage 40 section), although it is hardly changeful. Having been a little weak was admitted.

[0042]

[A table 1]

	白アリ防除コンクリート組成 防除剤担持 吸着剤含有率 (コンクリート100部に対し)	防除剤を担持した吸着剤組成		
		吸着剤	防除剤	防除剤含有率 (吸着剤100部に対し)
実施例 1	10 部	活性炭	LB-300	5 部
" 2	25 "	"	"	5 "
" 3	40 "	"	"	5 "
" 4	10 "	"	"	10 "
" 5	10 "	"	"	20 "
" 6	10 "	"	"	30 "
" 7	10 "	"	クレオソート油	30 "
" 8	10 "	"	し-250	5 "
" 9	10 "	"	"	10 "
" 10	10 "	"	"	20 "
" 11	10 "	"	"	30 "
" 12	10 "	ゼライト	L-250	5 "
" 13	10 "	"	"	10 "
" 14	10 "	"	"	20 "
" 15	10 "	"	"	30 "
比較例 1	10 部	活性炭	—	—
" 2	10 "	クレオソート油	—	—
" 3	クレオソート油 30部	—	—	—
" 4	—	—	—	—

[0043] Next, it is 200ml of water to the bottom of the desiccator (drum bore of 210mm) which does not carry out a plug Kamiguchi made from Pyrex glass, and with horizontal opening. It puts in and puts into the thermostat which carried out temperature control to 25 degrees C.

[0044] 96mm phi Petri dish (petri dish) of glass which put in ten termites on the medium plate of a desiccator is put in.

[0045] 10g of then, concrete samples of the example adjusted previously and the example of a comparison It put in in the center of a Petri dish, and was left, and the behavior of a termite was observed.

[0046] The test was carried out into the following group using six desiccators at once.

Action of the test ** examples 1-4, the example 1 of a comparison, 4 ** ** 5-8, ** 1, 4** ** 9 to 12 ** 2, 3** ** 13 to 15 ** 3, and 4 termites was observed for every time amount progress, and the effectiveness of termite prevention concrete was investigated. The result is shown in a table 2.

[0047] In addition, behavior until a termite results in extinction is ->which moves violently ->upper half of the body to which the behavior ->motion which moves about, and to ->Lick becomes blunt. It was the sequence of ->extinction which starts -> KEIREN from which a walk becomes impossible and moves a guide peg violently and which ->Stops moving.

[0048] According to this, it moved about, and moved by the table, and only the event of blunt death (inside of ten animals, O **) was taken up and indicated.

[0049]

[A table 2]

	経 過 時 間 (Hr)					
	0	1	2	3	5	24
実施例 1	動き廻る	動き廻る	動き廻る	動き廻る	動き廻る	全 死
" 2	"	"	"	"	"	9 匹死
" 3	"	"	"	動き鈍い	動き鈍い	全 死
" 4	"	"	"	動き廻る	動き廻る	8 匹死
" 5	"	"	"	動き鈍い	動き鈍い	全 死
" 6	"	"	"	"	2 匹死	"
" 7	"	"	"	動き鈍い	動き鈍い	9 匹死
" 8	"	"	"	動き廻る	動き廻る	全 死
" 9	"	"	"	動き鈍い	動き鈍い	"
" 10	"	"	動き鈍い	動かない	2 匹死	"
" 11	"	"	"	"	3 匹死	"
" 12	"	"	"	"	4 匹死	"
" 13	"	"	"	"	2 匹死	"
" 14	"	"	"	"	3 匹死	"
" 15	"	"	"	"	3 匹死	"
比較例 1	動き廻る	動き廻る	動き廻る	動き廻る	動き廻る	動き廻る
" 2	"	"	"	"	"	"
" 3	"	"	"	"	"	"
" 4	"	"	動き鈍い	動き鈍い	動き鈍い	全 死

[0050] Moreover, organoleptics investigated the odor of the termite prevention concrete removed from

shuttering, and the result was shown table 3.

[0051]

[A table 3]

	白アリ防除コリクリートの臭気	
	コンクリート 調整直後	高温・減圧下 で放置後
実施例 1	無 臭	無 臭
" 2	" "	" "
" 3	" "	" "
" 4	" "	" "
" 5	" "	" "
" 6	" "	" "
" 7	" "	" "
" 8	" "	" "
" 9	" "	" "
" 10	" "	" "
" 11	" "	" "
" 12	" "	" "
" 13	僅かに臭う	僅かに臭う
" 14	" "	" "
" 15	少し臭う	少し臭う
比較例 1	無 臭	無 臭
" 2	粉っぽい臭い (塵 臭)	粉っぽい臭い (塵 臭)
" 3	" "	" "
" 4	強い臭い	僅かに臭う

[0052] Furthermore, it is under an elevated temperature and reduced pressure about the concrete obtained in an aforementioned example and the aforementioned example of a comparison. (60 degrees C, 100mmHg) After leaving it for one month and saving one nights by ordinary temperature and ordinary pressure further, by the same trial as the above, the behavior of a termite was observed and the effectiveness of termite prevention concrete was investigated. The result is shown in a table 4.

[0053]

[A table 4]

	経 過 時 間 (Hr)					
	0	1	2	3	5	24
実施例 1	動き廻る	動き廻る	動き廻る	動き廻る	動き廻る	全 死
" 2	"	"	"	"	"	8 匹死
" 3	"	"	"	動き鈍い	動き鈍い	全 死
" 4	"	"	"	動き廻る	動き廻る	9 匹死
" 5	"	"	"	動き鈍い	動き鈍い	全 死
" 6	"	"	"	"	2 匹死	"
" 7	"	"	"	動き鈍い	動き鈍い	8 匹死
" 8	"	"	"	動き廻る	動き廻る	全 死
" 9	"	"	"	動き鈍い	動き鈍い	"
" 10	"	"	動き鈍い	動かない	2 匹死	"
" 11	"	"	"	"	3 匹死	"
" 12	"	"	"	"	4 匹死	9 匹死
" 13	"	"	"	"	2 匹死	全 死
" 14	"	"	"	"	3 匹死	"
" 15	"	"	"	"	3 匹死	"
比較例 1	動き廻る	動き廻る	動き廻る	動き廻る	動き廻る	動き廻る
" 2	"	"	"	"	"	"
" 3	"	"	"	"	"	"
" 4	"	"	"	"	"	"

[0054] Moreover, under an elevated temperature and reduced pressure (60 degrees C, 100mmHg) After leaving it and saving one nights by ordinary temperature and ordinary pressure further, the same organoleptics as the above investigated the odor of termite prevention concrete. The result is also collectively shown in a table 3.

[0055] Behavior to which he walks and the examples 1, 2, 5, and 6 with few [when the termite prevention concrete immediately after adjustment is made to coexist with a termite] amounts of support of a prevention agent than the result of a table 2 and a table 4 are eating the concrete top the surroundings was observed. Probably for the reason, there is effectiveness of at least extinction of the amount of prevention agent support. It almost became extinct in 24 hours.

[0056] moreover, constant temperature — the effectiveness over the termite after leaving it under — reduced

pressure is almost as unchanging as immediately after adjustment, when an adsorbent is made to support a prevention agent and concrete is made to contain it. However, when concrete is made to contain only a direct prevention agent, it is admitted that validity is declining substantially. Moreover, the same is said of the result of the organoleptics of the odor of concrete.

[0057] As for the prevention agent, effect texture was accepted [the emulsion] for the inclination for the zeolite to be earlier than activated carbon, with early and an absorbent from oils.

[0058]

[Effect of the Invention] This invention is the concrete containing the adsorbent which made the termite prevention agent adsorb and support, and prevents the erosion of the house by the termite in an operation of the prevention agent which concrete diffuses by using it for the foundation of the house which serves as a path as in case a termite goes into timber. Furthermore, there is the description which can hold the prolonged prevention effectiveness according to a gradual release operation of an adsorbent.

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(54) 【発明の名称】 白アリ防除コンクリート

(57) 【要約】

【構成】白アリ防除剤を吸着せしめた、活性炭、ゼオライト、活性アルミナ及びシリカゲルからなる群より選ばれた一種または二種以上の吸着剤をコンクリートに含有せしめてなる白アリ防除コンクリートである。ここで吸着剤に担持させた白アリ防除剤の含有率が、コンクリート100部に対して1～30部である場合及び、白アリ防除剤にクロルピリホスまたは、クレオソート油、8-ヒドロキシキノリンを使用した場合がより好ましい。

【効果】本発明は白アリ防除剤を吸着・担持させた吸着剤を含有したコンクリートで、白アリが木材に入る場合の通り道となる家屋の基礎に使用することにより、コンクリートが放散する防除剤の作用で白アリによる家屋の蟻食を防止するものである。更に、吸着剤の徐放作用により長期間防除効果を保持出来る特徴がある。

【特許請求の範囲】

【請求項1】 白アリ防除剤を吸着せしめた、活性炭、ゼオライト、活性アルミナ及びシリカゲルからなる群より選ばれた一種または二種以上の吸着剤をコンクリートに含有せしめてなる白アリ防除コンクリート。

【請求項2】 白アリ防除剤を吸着せしめた吸着剤の含有率が、コンクリート100部に対して1～30部である請求項1記載の白アリ防除コンクリート。

【請求項3】 白アリ防除剤がクロルピリホスまたは、クレオソート油、8-ヒドロキシキノリンである請求項1記載の白アリ防除コンクリート。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は白アリ防除コンクリートに関するもので、更に詳しく述べると白アリ防除剤を含むコンクリートを家屋の基礎に使用するとにより、白アリが地中から家屋の木材に入ることを妨げると共に、吸着剤の徐放効果により長期間にわたってその効果を保持出来る特徴を有するものである。

【0002】

【従来の技術】従来から家屋を白アリから保護する方法としては、木材に防除剤を塗布、注入する方法或いは土地全体を消毒する方法として、例えば特開平1-295948号公報等が開示されている。しかし、白アリ防除機能を付与したコンクリートは知られていない。また、防除剤はいずれも毒性があり悪臭を伴うものも多いため、人が直接触れるおそれがある家屋の柱等に白アリ防除剤を含有させることは好ましくない。これらの防除剤の中、特に毒性が強いディルドリン、ヘプタクロル、BHC(ベンゼンヘキサクロライド)、DDT(p,p'-ジクロルジフェニルトリクロルエタン)、PCP(ペンタクロロフェノールナトリウム塩)等は、その他の環境への配慮もあり既に使用が禁止されている。

【0003】家屋を新築する際これらの方法により木材に白アリ防除処理を施しても、その効果持続期間は数年程度の場合が多く、念入りの防除処理を施しても10年が限度とされている。従って、白アリ防除効果を維持するためには数年～10年毎に防除処理を繰り返す必要がある。しかし、現存家屋の白アリ防除処理には多額の費用を要するため大きな問題になっている。

【0004】白アリ防除効果の消失原因は、防除剤の有効成分は総て揮発性であるから長期間に徐々に蒸発して消失すること及び、家屋の柱を支えるコンクリート基礎に隙間が生じ、白アリが地中から家屋の基礎を伝わって木材の内部に入る通路が出来るためである。

【0005】

【発明が解決しようとする課題】前述の様な問題点にかんがみ、白アリによる家屋の木材の蚕食を防止するため、地中に生息している白アリが木材に入る場合通り道となる家屋の基礎に使用するための、白アリの防除機能

を有するコンクリートを開発して提供しようとするものである。

【0006】

【課題を解決するための手段】本発明者は白アリが木材を蚕食して家屋を崩壊させる場合、白アリは殆ど地中から家屋のコンクリート基礎の間隙或いは表面を通して柱に侵入する事実に着目した。白アリの被害を防止するためにはコンクリート基礎に白アリが通過出来ない材質を使用してその通り道を遮断すれば、木材自体に白アリ防除性を付与しなくても白アリの被害が防止できる点に着目し、白アリ防除性を有するコンクリートの組成について研究した。

【0007】その結果、コンクリートに白アリ防除剤を担持した吸着剤を混合することにより、高い白アリ防除性を付与出来ることを発見し更に、防除剤を特定の吸着剤に担持させた場合防除剤が吸着剤の細孔から徐々に放散されるため、その効果が長期間保持出来ることを見出し、これに基づいて本発明に到達した。

【0008】すなわち、白アリ防除剤を吸着せしめた、活性炭、ゼオライト、活性アルミナ及びシリカゲルからなる群より選ばれた一種または二種以上の吸着剤をコンクリートに含有せしめてなる白アリ防除コンクリートである。

【0009】ここで吸着剤に担持させた白アリ防除剤の含有率が、コンクリート100部に対して1～30部である場合及び、白アリ防除剤にクロルピリホスまたは、クレオソート油、8-ヒドロキシキノリンを使用した場合がより好ましい。

【0010】以下本発明について詳しく説明する。

【0011】本発明の白アリ防除コンクリートは、白アリ防除剤を吸着・担持させた特定の吸着剤をコンクリートに含有させたものである。白アリ防除剤には多くの薬剤が知られているが、毒性が強いものが多くその他環境上の配慮もありBHC、DDT等の様に使用が禁止されているものもある。使用可能な防除剤としては例えば、クレオソート油、クロルピリホス、ピリダフェンチオン及びテトラクロルピリホス等がある。これらの中、クレオソート油と有機リン系化合物ではあるが毒性が比較的少なく防除効果が高いクロルピリホス(0,0-ジエチル0-3,5,6-トリクロル-2-ピリジル-ホスホロチオエート)、及び8-ヒドロキシキノリンが好ましい。更に、8-ヒドロキシキノリンとこれらの金属例えばZn、Al、Fe、Mn、Cu、Mg、Sn、Ni、Co、Ba、Ca及びSr等との錯体、8-ヒドロキシキノリンとこれらの金属の塩化物、硫酸塩、硝酸塩、亜硝酸塩、亜硫酸塩、リン酸塩、炭酸塩、重炭酸塩、ケイ酸塩、有機シュウ酸塩その他の有機多塩基酸塩等も使用可能である。

【0012】本発明において前述の白アリ防除剤を吸着させるためには、活性炭、ゼオライト、活性アルミナ及びシリカゲルからなる群より選ばれた一種または二種以

上の吸着剤を使用する必要がある。

【0013】ここで使用する活性炭は、通常1gあたり数100 m² 或いはそれ以上の大きな表面積を有し、高い吸着性を示す炭素材料であれば広範囲に使用できる。活性炭の原料は通常ヤシ殻または木材等の炭化物或いは石炭が使用されるが何れでもよい。また賦活法も水蒸気或いは二酸化炭素により高温でまたは塩化亜鉛、リン酸、濃硫酸処理等いずれの方法により得られたものでもよい。

【0014】また活性炭の形状は粒状炭、破碎炭、造粒炭或いは顆粒炭の何れでもよく、また、繊維状活性炭は特に比表面積が大きいものが得易く高い吸着性を有する他、コンクリートに混入した場合その強化材としての機能もある。造粒炭は常法に従って炭素材料100部に30～60部の石油ビッチ或いはコールタール等をバインダーとして加え混和成型後賦活して調整される。

【0015】活性炭は炭素表面からなる無数の細孔を含み、大きなファンデルワールス力を持つ無極性吸着剤として知られ、極めて優れた吸着性を有する特異な物質である。殆どすべてのガス状或いは液状物質に対して高い吸着性を示すと共に、アルカリ性を有するため白アリの分泌する蟻酸を中和してコンクリートを保護する機能もある。

【0016】本発明に使用されるゼオライトは主としてアルカリまたはアルカリ土類金属のアルミノ珪酸塩からなり、メタン型構造のSiO₄四面体とAlO₄四面体が互いに1個ずつの炭素原子を共有した形の、規則性がある大きな空洞をもった三次元の骨格構造を形成している。

【0017】ゼオライトを形成している骨格の酸素原子を含むの環状構造により、ゼオライトは3～10Åの範囲の一定した孔径をもっていて、この細孔構造に基づく分子篩性を有すると共に500 m²/g以上に達する大きな比表面積を有し、ファンデルワールス力による高い吸着性を示す。本発明に使用するゼオライトはその組成、構造、細孔容積、粒度、形状は特に限定せず、また、合成法により得られる均整な孔径を有するものの他、カイヤク石、フッ石等天然に産出するゼオライトも使用可能である。

【0018】本発明に使用される活性アルミナは、酸化アルミナを主成分とした組成を持ち細孔構造による大きな比表面積を有すると共に、そのファンデルワールス力によって高い吸着性を示す。その細孔容積、粒度、形状は特に限定しないが、白アリ防除コンクリートに混入した場合の吸着容量その他の性状を考慮して、細孔容積は0.3ml/g以上で粒度は30～60メッシュ（粒子径約0.2～0.4mm）が好ましい。

【0019】また、本発明に使用されるシリカゲルは、ケイ酸コロイド溶液を凝固させて製造された吸着剤である。主成分は二酸化ケイ素で細孔構造を有し、90～500 m²/gの比表面積を持ち、そのファンデルワールス力によって高い吸着性を示す。その細孔容積、粒度、形状は特

に限定しないが、白アリ防除コンクリートに混入した場合の吸着容量その他の性状を考慮して、細孔容積は0.3ml/g以上で粒度は30～60メッシュ（粒子径約0.2～0.4mm）が好ましい。

【0020】前述の吸着剤はいずれも細孔構造及び大きな比表面積を有し、そのファンデルワールス力によって高い吸着性を示す共通性を持っている。白アリ防除剤をコンクリートに含有させる目的だけであれば、直接混合するかまたは、固形防除剤を他の物質と混合造粒した後混合するか或いは、コンクリートに混入する補強用繊維に含有させる方法等もある。しかし、本発明の白アリ防除コンクリートは白アリの防除剤を特定の吸着剤に吸着させることにより、防除剤をその細孔内に保持させている点に特徴がある。

【0021】白アリ防除剤は吸着剤の細孔内に保持され、吸着剤のファンデルワールス力により徐放性が付与されている。従って、微小な細孔構造が発達し高い比表面積を有する吸着剤徐放性に優れ、長期間その効果を持続することが可能になり好ましい。この観点からはこれらの吸着剤の中、活性炭及びゼオライトがより好ましい。

【0022】吸収剤は粒状、粉末状、セシイ状いずれも使用可能である。また、防除剤を担持した吸着剤の粒子は、白アリの通路となるコンクリート基礎の狭い間隙を閉鎖するには粒径が小さい方が効果的であるが、取扱上から30～60メッシュ程度が好ましい。

【0023】白アリ防除剤は液体であれば油剤、乳剤を問わず、これらの吸着剤に吸着・担持させて使用することが出来る。また、吸着剤への防除剤の担持量は特に限定しないが、吸着剤100部に対して1～50部の範囲が好ましい。

【0024】本発明の白アリ防除コンクリートは、白アリ防除剤を吸着・担持させた吸着剤を含有させたコンクリートである。コンクリートには砂利、砂、セメントに水を加えて混合した通常のコンクリートの他、本発明には砂とセメントに水を加えて混合したモルタルも含まれている。ここでコンクリート及びモルタルを調整する場合の砂、セメント、水等の混合比率は通常使用される広範囲な比率が適用出来る。

【0025】コンクリートを調整する際砂利、砂、セメントに水を加えて混合した後、未だ固化しない前に、白アリ防除剤を吸着・担持させた吸着剤を加えて均一に混合して固化させることにより、本発明の白アリ防除コンクリートが得られる。吸着剤の含有率は特に限定しないが、コンクリートの強度を保つためには吸収剤は少ない方が好ましいが、白アリ防除効果を考慮すればコンクリート100部に対して1～30部が好ましい。防除剤を担持した吸着剤の含有率が1部以下では防除作用がやや不十分となり、一方、吸着剤の含有率が30部以上になるとコンクリートの強度がやや低下する傾向を示すからであ

る。しかし、吸着剤の含有率は吸着剤が活性炭繊維の様にコンクリートの補強機能も有する場合には、更に吸着剤の含有率を高めても強度が低下しない場合がある。

【0026】各種吸着剤に同量の防除剤を担持させても吸着剤の特性によりその効果が異なる。例えば、クロロピリホスを主成分としたレントレク（ダウケミカル社製、白アリ防除剤）LB-300（油剤）を5部担持すると、活性炭繊維の場合白アリはすぐ逃げる。アルミナ、シリカゲル、ゼオライト、粒状活性炭等の場合は白アリは近よって行くが、或る程度の距離で停止しその後死滅する。更に担持量が増えたとすぐ逃げる様になる。

【0027】吸着剤を混合してコンクリートを調整した場合も白アリの挙動はほぼ同様で、防除剤30部を活性炭100部に担持させたもの5部を、コンクリート100部に混合させた場合、白アリはその上を歩き、なめる様な動作した後しばらくして死滅する。

【0028】尚、前述の白アリ防除剤を吸着・担持させた吸着剤は単一でコンクリートに含有させてもよく、或いは防除剤を担持した複数の吸着剤を任意の比率で混合してコンクリートに含有させてもよい。また、本発明のコンクリートには補強材、防水剤等その他の成分を併せて混合したものも使用出来る。

【0029】本発明の白アリ防除コンクリートを実際に調整するには例えば、吸着剤としてヤシ殻を原料として得られた粒度30～60Meshの活性炭100部に、白アリ防除剤としてレントレク油剤 LB-300、（ダウケミカル社製）30部を粒状活性炭の上に振り掛けながら、均一に混合し1夜以上密閉・放置する。尚、放置時間は長い程担持量が均一となり好ましい。

【0030】白アリ防除剤を吸着・担持した活性炭30部を、常法の配合比率で混合したコンクリート100部が未だ固化しない状態で均一に混合した後、固化させることにより白アリ防除コンクリートが得られる。

【0031】

【作用】コンクリートの混合・調整後時間経過に伴い水分が抜けてコンクリートが硬化すると共に、コンクリート内部に微細な空隙が生成する。コンクリート内部の吸着剤に保持されてきた白アリ防除剤は徐々に放散されてこの空隙に充填し、またコンクリートの壁面外部にも絶えず微量の防除剤が放散されている。

【0032】白アリが家屋の柱を蚕食する場合、殆ど白アリが生息する地中からコンクリート基礎のクラック或いは表面を通して柱に入るが、コンクリート内部のクラック及び外部壁面には防除剤が放散されているため白アリの通過が阻止され、これによって白アリによる家屋の蚕食・崩壊が防止さる。

【0033】更に、本発明の白アリ防除剤はいずれも揮

発性であるが、吸着剤は細孔表面の強いファンデルワールス力の作用により細孔内に吸着されていたため、単に防除剤を含浸させた場合に比較して揮発性が著しく抑制される。このため長期間に渡って白アリ防除剤が徐々に放出され、防除効果が保持することが出来る。

【0034】

【実施例】以下実施例を挙げて本発明を更に具体的に説明する。

【0035】（実施例1～15、比較例1～4）吸着剤としてはヤシ殻を原料として得られた比表面積1000 m²/g、粒度30～60Meshの活性炭と、孔径 5Å、平均粒径10 μmの天然ゼオライトを使用した。

【0036】白アリ防除剤としてはトリクロロピリジル系の有機リン化合物である商品名「シントーレントレク油剤 LB-300 及び乳剤 L-250（米ダウケミカル社製）とクレオソート油を使用した。先ず吸着剤に白アリ防除剤を振り掛け、均一に混合した後、密閉状態で1夜保存し、防除剤を吸着・担持させた。

【0037】コンクリートとしては、砂：ポルトランドセメント：水を4：2：1で混練し、JIS A 1138に準じてコンクリートモルタルを調整した。コンクリートモルタル100部に対して、先に調整した白アリ防除剤を表1に示した比率で担持した吸着剤を加えて均一に混合し、白アリ防除コンクリートを調整した（実施例1～15）。

【0038】比較のため、コンクリート100部に対して、活性炭のみ及びゼオライトのみを10部混合したもの、クレオソート油のみ30部混合したもの、更にコンクリートモルタルのみを調整した（比較例1～4）。

【0039】前述の様に調整した未だ固化しないコンクリートモルタルをモルタル三連型枠に投入し、つき棒でむらなく充填して気泡を除いた後、2日間熟成して型枠から取り外した。

【0040】更に、7日間以上養生を行ったものをハンマーで砕き、5～20mmの粒径に整えて、白アリ防除コンクリートを得た。前記の様にして得られた実施例1～15及び比較例1～4の組成を表1に示す。尚、表においてシントーレントレク油剤 LB-300 及び乳剤 L-250 を、それぞれ LB-300 及びL-250 と表示した。

【0041】得られたコンクリートをハンマーで砕く際強度を調べた。吸着剤の油剤含有率が同一で、コンクリートへの混合率が異なる実施例1～3を比較した結果、実施例1（コンクリート100部に対して混合率10部）及び実施例2（混合率25部）の強度は殆ど変化ないが、実施例3（混合率40部）はやや脆くなっていることが認められた。

【0042】

【表1】

	白アリ防除コンクリート組成 防除剤担持 吸着剤含有率 (コンクリート100部に対し)	防除剤を担持した吸着剤組成		
		吸着剤	防除剤	防除剤含有率 (吸着剤100部に対し)
実施例 1	10 部	活性炭	LB-300	5 部
" 2	25 "	"	"	5 "
" 3	40 "	"	"	5 "
" 4	10 "	"	"	10 "
" 5	10 "	"	"	20 "
" 6	10 "	"	"	30 "
" 7	10 "	"	クオート油	30 "
" 8	10 "	"	L-250	5 "
" 9	10 "	"	"	10 "
" 10	10 "	"	"	20 "
" 11	10 "	"	"	30 "
" 12	10 "	ホワイト	L-250	5 "
" 13	10 "	"	"	10 "
" 14	10 "	"	"	20 "
" 15	10 "	"	"	30 "
比較例 1	10 部	活性炭	—	—
" 2	10 "	クオート油	—	—
" 3	クオート油 30部	—	—	—
" 4	—	—	—	—

【0043】次にバイレックスガラス製上口、横口付きで栓をしないデシケーター（胴内径210mm）の底に水200mlを入れ、25℃に温度調節した恒温槽に入れておく。

【0044】デシケーターの中板上に白アリ10匹を入れたガラス製96mmφベトリ皿（シャーレ）を入れる。

【0045】続いて先に調整した実施例及び比較例のコンクリート試料10gを、ベトリ皿中央に入れて放置し白アリの挙動を観察した。

【0046】テストは一度にデシケーター6個を用い下記のグループで実施した。

テスト① 実施例1～4、比較例1、4

" ② " 5～8、" 1、4

" ③ " 9～12 " 2、3

* ④ " 13～15 " 3、4

20 白アリの行動を時間経過毎に観察して、白アリ防除コンクリートの効果を調べた。その結果を表2に示す。

【0047】尚、白アリが死滅に至る迄の挙動は、動き回る→なめるしぐさ→動きが鈍くなる→上半身を激しく動かしたりする→歩行が不可能になり足を激しく動かす→ケイレンを起こす→動かなくなる→死滅の順序であった。

【0048】表ではこれに従って、動き回る、動き鈍い、（10匹の中、○匹）死の時点のみをピックアップして記載した。

【0049】

*30 【表2】

	経 過 時 間 (Hr)					
	0	1	2	3	5	24
実施例 1	動き回る	動き回る	動き回る	動き回る	動き回る	全 死
" 2	"	"	"	"	"	9匹死
" 3	"	"	"	動き鈍い	動き鈍い	全 死
" 4	"	"	"	動き鈍い	動き鈍い	8匹死
" 5	"	"	"	動き鈍い	動き鈍い	全 死
" 6	"	"	"	動き鈍い	動き鈍い	2匹死
" 7	"	"	"	動き鈍い	動き鈍い	8匹死
" 8	"	"	"	動き鈍い	動き鈍い	全 死
" 9	"	"	"	動き鈍い	動き鈍い	"
" 10	"	"	動き鈍い	動き鈍い	動き鈍い	"
" 11	"	"	"	動き鈍い	動き鈍い	"
" 12	"	"	"	"	3匹死	"
" 13	"	"	"	"	4匹死	"
" 14	"	"	"	"	2匹死	"
" 15	"	"	"	"	3匹死	"
比較例 1	動き回る	動き回る	動き回る	動き回る	動き回る	動き回る
" 2	"	"	"	"	"	"
" 3	"	"	"	"	"	"
" 4	"	"	動き鈍い	動き鈍い	動き鈍い	全 死

【0050】また、型枠から取り外した白アリ防除コンクリートの臭気を官能試験によって調べ、その結果を表3示した。

【0051】

【表3】

	白アリ防除コンクリートの臭気	
	コンクリート調整直後	高温・減圧下で放置後
実施例 1	無臭	無臭
" 2	"	"
" 3	"	"
" 4	"	"
" 5	"	"
" 6	"	"
" 7	"	"
" 8	"	"
" 9	"	"
" 10	"	"
" 11	"	"
" 12	"	"
" 13	僅かに臭う	僅かに臭う
" 14	"	"
" 15	少し臭う	少し臭う
比較例 1	無臭	無臭
" 2	粉っぽい臭い(塵臭)	粉っぽい臭い(塵臭)
" 3	"	"
" 4	強い臭い	僅かに臭う

*【0052】更に、前記の実施例及び比較例で得られたコンクリートを高温・減圧下(60℃、100mmHg)で1ヶ月放置し、更に常温・常圧で1夜保存した後、前記と同様な試験によって白アリの挙動を観察し、白アリ防除コンクリートの効果を調べた。その結果を表4に示す。

【0053】

【表4】

*

	経過時間 (Hr)					
	0	1	2	3	5	24
実施例 1	動き廻る	動き廻る	動き廻る	動き廻る	動き廻る	全死
" 2	"	"	"	"	"	8匹死
" 3	"	"	"	動き鈍い	動き鈍い	全死
" 4	"	"	"	動き廻る	動き廻る	9匹死
" 5	"	"	"	動き鈍い	動き鈍い	全死
" 6	"	"	"	"	2匹死	"
" 7	"	"	"	動き鈍い	動き鈍い	8匹死
" 8	"	"	"	動き廻る	動き廻る	全死
" 9	"	"	"	動き鈍い	動き鈍い	"
" 10	"	"	動き鈍い	動かない	2匹死	"
" 11	"	"	"	"	3匹死	"
" 12	"	"	"	"	4匹死	9匹死
" 13	"	"	"	"	2匹死	全死
" 14	"	"	"	"	3匹死	"
" 15	"	"	"	"	8匹死	"
比較例 1	動き廻る	動き廻る	動き廻る	動き廻る	動き廻る	動き廻る
" 2	"	"	"	"	"	"
" 3	"	"	"	"	"	"
" 4	"	"	"	"	"	"

【0054】また、高温・減圧下(60℃、100mmHg)に放置し、更に常温・常圧で1夜保存した後、白アリ防除コンクリートの臭気を前記と同様な官能試験によって調べた。その結果も併せて表3に示す。

【0055】表2及び表4の結果より、調整直後の白アリ防除コンクリートを白アリと共存させた場合には、防除剤の担持量が少ない実施例1、2、5、6はコンクリートの上を歩き回り、食べているようなくさが観察された。そのためか、防除剤担持量が少なくても死滅の効果がある。24時間で殆ど死滅した。

【0056】また恒温・減圧下に放置した後の白アリに対する効果は、防除剤を吸着剤に担持させてコンクリートに含有させた場合は、調整直後と殆ど変わらない。し

かし、コンクリートに直接防除剤のみ含有させた場合には効力が大幅に低下していることが認められる。また、コンクリートの臭気の官能試験の結果も同様である。

【0057】防除剤は油剤より乳剤の方が効きめが早く、また、吸収剤では活性炭よりゼオライトの方が早い傾向が認められた。

【0058】

【発明の効果】本発明は白アリ防除剤を吸着・担持させた吸着剤を含有したコンクリートで、白アリが木材に入る場合の通り道となる家屋の基礎に使用することにより、コンクリートが放散する防除剤の作用で白アリによる家屋の蚕食を防止するものである。更に、吸着剤の徐放作用により長期間防除効果を保持出来る特徴がある。

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